

REMARKS

Independent claim 1 has been amended to specify that the cathode includes manganese dioxide and between 6% and 10% of carbon fibers by weight, and that the anode includes zinc. Support for the amendments can be found in original claim 1 and in dependent claims 8 (manganese dioxide) and 30 (zinc). Claims 8 and 30 have been cancelled. Dependent claims 9-12 and 27 have been amended to be consistent with claim 1 as amended.

Independent claim 31 also has been amended to specify that the cathode includes between 6% and 10% of carbon fibers by weight and that the anode includes zinc. Dependent claims 33 and 34 have been amended to be consistent with claim 31 as amended.

Independent claim 35 has been amended in the same manner as claim 1, and dependent claims 36 and 53 have been amended to be consistent with claim 35 as amended. Claim 56 has been cancelled.

New claims 57 and 58 depend from claims 1 and 35, respectively and specify that the cathode includes between 6% and 7% of carbon fibers by weight. Support for this amendment can be found, for example, on page 2, lines 10-12 of the application.

No new matter has been added.

Claim 16 has been amended to address the claim objection raised by the Examiner.

Claims 1, 8-10, 19, 30, 31, and 33 were rejected under 35 U.S.C. § 103(a) over Friend, EP 0 962 997 A1, ("Friend") in view of Adams, U.S. Pat. 4,177,157 ("Adams"). Applicants request that the rejection be reconsidered and withdrawn. Applicants will focus the discussion on claims 1 and 31.

Claims 1 and 31 relate to primary alkaline batteries having a cathode including manganese dioxide and 6%-10% of carbon fibers by weight, an anode including zinc, and an alkaline electrolyte. This is a specific type of battery having specific design criteria.

Friend discloses carbon fibers that can be used in various types of batteries, including alkaline batteries having a cathode including manganese dioxide and an anode including zinc, and an alkaline electrolyte. Importantly, Friend states that the cathode of such alkaline batteries preferably should include less than 5%, and more preferably less than 2%, of the microfibers by weight based on the weight of the manganese dioxide in the cathode. See Friend, ¶ 9. Friend

discloses a specific example of a cathode including 5.14% of the carbon fiber by weight (see Example I in Table II in paragraph 39). But the plain teaching of Friend is to use about 5% or less of the carbon fibers by weight in the cathode.

Adams relates to alkaline batteries having a cathode including nickel hydroxide and an anode including zinc. Adams focuses primarily on "coagulating PTFE particles" that act as a binder in forming the cathode. Adams mentions that "conductive diluents" such as graphite may be included to the electrode because the nickel hydroxide is not inherently conductive. See Adams, col. 4, lines 20-25. Adams says the graphite can be in the form of powder and/or fibers, and that:

The total graphite content of a nickel electrode, for example, advantageously comprises up to about 30% by weight of the dry filter cake with about 23%-30% being preferred. The graphite therein is preferably in both the powdered and fibrous form (i.e. about 0.5 mm long), there being about half again as much powdered graphite (i.e. by weight) as there is fibrous graphite, though this can vary considerably.

See id. lines 25-36.

The Examiner contends that a person of ordinary skill in the art would have been motivated to raise the amount of carbon fibers in Friend's manganese dioxide cathode to 6%-10% by weight based on the quantity of carbon (graphite) fibers used by Adams in his nickel hydroxide electrode. This contention is nonsense. Friend provides specific guidance for how much carbon fibers should be included in his manganese dioxide cathode -- about 5% and more preferably a lot less. Friend plainly achieves good conductivity with this amount of carbon fibers and plainly wants to use as small a quantity of carbon fibers as possible in order to maximize the quantity of manganese dioxide (the cathode active material) in the cathode.

Adams, on the other hand, dumps much larger quantities of carbon (the graphite) generally into his nickel hydroxide cathode because such large quantities are needed to achieve adequate conductivity in a cathode including a combination of nickel hydroxide (as cathode active material) and PTFE (as binder). Adams has no applicability to the manganese dioxide cathode described by Friend. Thus, a person of ordinary skill in the art would not be motivated, based on Adams, to include 6%-10% of carbon fibers by weight in the manganese dioxide cathode described by Friend.

For the above reasons, the 35 U.S.C. § 103(a) rejection of claims 1, 8-10, 19, 30, 31, and 33 based on Friend in combination with Adams should be withdrawn.

Applicants also note that claim 31 requires using heat-treated carbon fibers, and neither Friend nor Adams describes heat-treated carbon fibers.

Claims 13-18, 20-22, 35, 36, 39-41, 43-48, 50, and 56 were rejected under 35 U.S.C. § 103(a) over Friend, in view of Adams, and further in view of Anderson, U.S. Pat. 4,948,484 ("Anderson"), and further in view of Yagi, U.S. Pat. 4,923,637 ("Yagi"). Claim 56 has been cancelled. Claims 13-18 and 20-22 depend from claim 1 and the rejection of these claims should be withdrawn once the rejection of claim 1 based on Friend and Adams is withdrawn.

Of the remaining claims, claim 35 is independent and claims 36, 39-41, 43-48, 50, and 56 depend from claim 35. Applicants request that this rejection be reconsidered and withdrawn. Applicants will focus the discussion on claim 35.

Claim 35 relates to primary alkaline batteries having a cathode including about 82%-92% of manganese dioxide by weight and 6%-10% of heat-treated carbon fibers by weight, an anode including zinc, and an alkaline electrolyte. The Examiner combined Friend and Adams to construct a primary alkaline battery having a cathode including manganese dioxide and 6%-10% of carbon fibers by weight, an anode including zinc, and an alkaline electrolyte. The Examiner then reaches to Anderson for the quantity of manganese dioxide required by claim 35, and then to Yagi for heat-treated carbon fibers.

The 35 U.S.C. § 103(a) rejection of claim 35 should be withdrawn because a person of ordinary skill in the art would not have been motivated to use 6%-10% of carbon fibers by weight in Friend's manganese dioxide cathode in view of Adams' nickel hydroxide cathode, for the reasons discussed previously.

Focusing now of Yagi, Yagi discloses "high conductivity carbon fiber" that is designed for use in resin or rubber composites. Applicants acknowledge that Yagi's carbon fibers are heat treated, and also acknowledge that Yagi mentions in passing that the "conductive resin composite" can be used "as conductive material, battery material, hydrogen absorbing material, catalyst material, etc." See Yagi, col. 11, lines 6-10. But the Examiner has not explained why a person of ordinary skill in the art would decide to take Yagi's carbon fibers and use them in Friend's manganese dioxide cathode. Yagi's carbon fibers are designed for use in combination

in a resin or rubber composite, and the carbon fibers used by Friend are not part of a resin or rubber composite.

Moreover, to the extent Yagi teaches that heat-treated carbon fibers are desirable because of their enhanced conductivity, to the extent a person of ordinary skill in the art, building Friend's manganese dioxide cathode, looks to Yagi for guidance that person would be guided to reduce the quantity of carbon fibers in Friend's manganese dioxide cathode because of the enhanced conductivity of Yagi's heat-treated carbon fibers. That person certainly would not be motivated to increase the quantity of carbon fibers to 6%-10%.

The 35 U.S.C. § 103(a) rejection of claim s35, 36, 39-41, 43-48, 50, and 56 based on Friend in view of Adams, and further in view of Anderson, and further in view of Yagi should be withdrawn for this addition reason.

Finally, applicants note that claims 16-18 also require using heat-treated carbon fibers. As mentioned above, claims 16-18 were also rejected under 35 U.S.C. § 103(a) over Friend, in view of Adams, and further in view of Anderson, and further in view of Yagi. This rejection should be withdrawn for the same reasons that the rejection of claim 35 should be withdrawn.

The remaining 35 U.S.C. § 103(a) rejections of dependent claims based on various combinations of references should be withdrawn once the 35 U.S.C. § 103(a) rejection of the base independent claims is withdrawn.

Applicants submit that the claims are in condition for allowance and such action is requested.

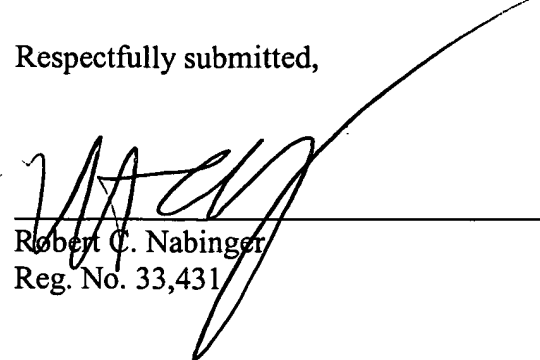
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Page : 12 of 12

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Respectfully submitted,

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